

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

REC'D 28 SEP 2005

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To:

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION See paragraph 2 below

International application No.
PCT/EP2005/000016

International filing date (day/month/year)
04.01.2005

Priority date (day/month/year)
08.01.2004

International Patent Classification (IPC) or both national classification and IPC
C01B31/02

Applicant
DEDIU VALENTIN

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/EP2005/000016

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ in written format
 - ☐ in computer readable form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
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International application No.
PCT/EP2005/000016

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-16
	No: Claims	
Inventive step (IS)	Yes: Claims	2, 4, 6-15
	No: Claims	1,3,5,16
Industrial applicability (IA)	Yes: Claims	1-16
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

Reference is made to the following documents:

- D1: GOKTAS H ET AL: "Carbon coating by double discharge pulsed electron beam generator" IEEE CONFERENCE RECORD - ABSTRACTS. 2002 IEEE INTERNATIONAL CONFERENCE ON PLASMA SCIENCE (CAT. NO.02CH37340) IEEE PISCATAWAY, NJ, USA, 2002, page 266, XP010602531 ISBN: 0-7803-7407-X
- D2: PATENT ABSTRACTS OF JAPAN vol. 1996, no. 12, 26 December 1996 (1996-12-26) & JP 08 217431 A (RES DEV CORP OF JAPAN; TANAKA SHUNICHIRO), 27 August 1996 (1996-08-27)

1- Remark:

Any dependent claim is construed as including all the limitations contained in the claim to which it refers (Rule 6.4(b) PCT). Dependent claims 4, 6-9 and 14 are mentioned as being dependent of claim 1 and thus do not fulfil Rule 6.4(b). For examination, those claims are considered to be dependent of claim 2.

2- Novelty:

D1 relates to a double discharge pulsed electron beam generator and the use of this device for the deposition of carbon on a substrate. More precisely, D1 refers to an attempt of the deposition of carbon nanotubes by electron irradiation of graphite.

It is well-known for the person skilled in the art that growth of nanotubes is invariably obtained via catalyzed processes, for example using transition metals as catalyst. The presence of catalyst in the process of D1 could thence be considered as *implicitly*

disclosed and D1 would therefore be a novelty destroying document.

However, no document cited in the prior art *explicitly* discloses a process for the production of single-wall and multi-wall carbon nanotubes by ablation of a graphite target containing metallic catalysts using pulsed electron beams.

Therefore, the subject-matter of claim 1 and its dependent claims 2-16 is new over the prior art (Article 33(2) PCT).

3- Inventive step:

Claims 1, 5:

Document D1 is regarded as being the closest prior art to the subject-matter of claim 1. D1 relates to a double discharge pulsed electron beam generator and the use of this device for the deposition of carbon on a substrate. More precisely, D1 refers to an attempt of the deposition of carbon nanotubes by electron irradiation of graphite.

The distinguishing feature between the subject-matter of claim 1 and D1 is that, in the process of claim 1, the graphite target contained metallic catalysts.

If the process of D1 is construed as using no catalyst, it would be obvious for the person skilled in the art, namely when the same result is to be achieved, to introduce catalytic particles in the graphite target of D1, thereby arriving to a process according to claims 1 and 5 of the present application.

Therefore, the subject-matter of claims 1 and 5 does not involve an inventive step in the sense of Article 33(3) PCT.

D2, which corresponds to the abstract of a japanese application, appears to be also an inventive step destroying document for claims 1 and 5.

Claims 3 and 16:

**WRITTEN OPINION OF THE
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International application No.

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The subject-matter of claims 3 and 16 appears to be design options that a person skilled in the art would consider using a process according to D1 and therefore does not seem to contain any additional features which, in combination with the features of the claim to which they refer, meet the requirements in respect of novelty or inventive step.

Claims 2, 4, 6-15:

There is no teaching from D1 or from another cited prior art which would suggest to the man skilled in the art to modify the process according to D1 thereby arriving to a process according to claim 2.

Therefore, the subject-matter of claim 2 and dependent claims 4, 6-15 satisfy the requirements of Article 33(1) and Article 33(3) PCT.

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Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-16
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1- Remark:

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Claims 2, 4, 6-15:

There is no teaching from D1 or from another cited prior art which would suggest to the man skilled in the art to modify the process according to D1 thereby arriving to a process according to claim 2.

Therefore, the subject-matter of claim 2 and dependent claims 4, 6-15 satisfy the requirements of Article 33(1) and Article 33(3) PCT.